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Abstract: Viewing objectivism and constructivism as the two opposing points of a continuum, rather than as the two mutually exclusive approaches, is not a new idea but such an idea can pave the way for more innovative studies in the field of learning environment research. At one extreme end, objectivist epistemology in practice will lead to objectivist learning environments which in turn bring about, among other things, teacher-centeredness, emphasis on textbooks, lack of students thinking, and lack of attention to students' interest and preferences. At the other extreme end, constructivist approach leads to constructivist learning environments which, amongst the rest, emphasize deep understanding, learner-centeredness, and students' responsibility and initiative. The significance of the idea reveals when a subtle look at CLES reveals that it has other capabilities which have passed unnoticed by learning environment researchers. CLES is also able to spot the exact place of a learning environment along an objectivist-constructivist continuum and it also can help researchers to meet the "cultural challenge" of creating a constructivist classroom.

Constructivist Learning Environment Survey (CLES): Other Capabilities

Abstract

Viewing objectivism and constructivism as the two opposing points of a continuum, rather than as the two mutually exclusive approaches, is not a new idea but such an idea can pave the way for more innovative studies in the field of learning environment research. At one extreme end, objectivist epistemology in practice will lead to objectivist learning environments which in turn bring about, among other things, teacher-centeredness, emphasis on textbooks, lack of students thinking, and lack of attention to students' interest and preferences. At the other extreme end, constructivist approach leads to constructivist learning environments which, amongst the rest, emphasize deep understanding, learner-centeredness, and students' responsibility and initiative. The significance of the idea reveals when a subtle look at CLES reveals that it has other capabilities which have passed unnoticed by learning environment researchers. CLES is also able to spot the exact place of a learning environment along an objectivist-constructivist continuum and it also can help researchers to meet the "cultural challenge" of creating a constructivist classroom.

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Introduction

Fraser (1994, 1998) defines learning environments as both social and psychological in nature, and believes that they are 'determinants' of learning. Such a definition embraces a vast array of hidden and unhidden aspects of a learning process as well as the most important ones or 'determinants' of learning. Such a definition leads not only to the significance of learning environments researches but also to the comprehensiveness of such studies. In other words, the picture such studies present of any educational setting is hardly obtainable through other approaches with such a thoroughness and quickness.

On the other hand, the way learning is defined affects all aspects of the learning process including learning environment. Constructivist epistemology in practice will lead to constructivist learning environments while objectivist views will lead to the creation of objectivist learning environments. Comparing objectivism and constructivism according to the learning environments they create gives us a more holistic picture of merits or demerits of these approaches. In addition, such a comparison shows how important the epistemology a teacher or an educator adopts or believes to is and how a simple assumption affects a range of factors which form 'determinants' of learning.

Furthermore, as many studies (e.g., Vrasidas, 2000 and Jonassen, 1991) emphasize, objectivism and constructivism are not mutually exclusive as some think. They should be viewed as two opposing points of one continuum. Such an idea and its ramification (i.e., the view that objectivist learning environments and constructivist learning environments are two opposing points of one continuum) can be of significance to the field of learning environments research since they add to the applications of one of the most widely used instruments in the field, Constructivist Learning Environment Survey (CLES). The actual form of CLES is also able to spot the exact place of a learning environment along an objectivist-constructivist continuum while the preferred form of this questionnaire can also help the researchers to explore how prepared respondents are to accept a classroom environment totally constructivist in culture.

The paper will be presented as following. First, the major philosophical assumptions of the two paradigms (i.e., objectivism and constructivism) are discussed. Then the major characteristics of (the most) objectivist and (the most) constructivist learning

environments are put forward. Then a continuum is defined with objectivist learning environments on the left end and constructivist ones on the right end. Finally, the contribution of such an idea for the field of learning environment research is presented.

Objectivism

For several years, the field of education has been dominated by objectivism. A large number of the traditional approaches to learning and teaching that are based on behavioristic and cognitive theories, share philosophical assumptions that are fundamental in objectivism (Vrasidas, 2000). Lakoff (1987, p.158) argues that objectivism is "one version of basic realism according to which reality exists independent of human mind". According to Jonassen (1991) and Lakoff (1987), the major assumptions of objectivism include: (I) There is a real world composing of entities structured based on their properties and relations. Categorization of these entities is based on their properties. (II) The real world is fully and correctly structured so that it can be modeled. (III) Symbols are representations of reality and can only be meaningful to the degree that they match reality. (IV) Human thought is symbol-manipulation and it is independent of the human organism. (V) The meaning of the world exists objectively, independent of the human mind and it is external to the knower. (VI) The human mind processes abstract symbols in a computer-like fashion so that it reflects nature.

An objectivist educator believes that there is one *true* and *correct* reality, which can be known to humans by using the objective methods of science. By studying the world we can identify its structure and entities as well as their properties and relations. We can then represent the world by using theoretical models and abstract symbols. These models and abstract symbols can then be mapped on the learners' minds. The learner's thought processes will manipulate those abstract symbols and they will come to know the world only when their minds mirror reality. As Lakoff (1987, p.163) puts it "knowledge consists in correctly conceptualizing and categorizing things in the world and grasping the objective connections among those things and those categories". Knowledge and learning are achieved when the abstract symbols that the learner came to know match the one and only real world. Any topic has only one correct way of understanding. Learning

is plainly defined as change in behavior and/or change in the learner's cognitive structures. Therefore, objectivist educators believe that instruction should be planned to effectively transfer the objective knowledge in the learner.

Constructivism

From this perspective, everyone constructs his own understanding of the world in which he lives. The basic and the most fundamental assumption of constructivism is that knowledge is not independent of the learner, it is constructed. Among the most prominent philosophers and educators associated with constructivism are Piaget (1970), Blumer (1969), Kuhn (1996), von Glasersfeld (1989), and Vygotsky (1978). Putting together Cobb (1994), Jonassen (1991) and Philips (1995), one can summarize the major philosophical and epistemological assumptions of constructivism as following. (I) There is a real world that puts boundaries to what we can experience. However, reality is local and there are multiple realities. (II) The mind creates symbols by perceiving and interpreting the world. (III) The structure of the world is created in the mind through interaction with the world and is based on interpretation. (IV) Meaning is a result of an interpretive process and it depends on the knowers' experiences and understanding. Symbols are products of culture and they are used to construct reality. (V) Human thought is imaginative and grows out of perception, sensory experiences, and social interaction.

There are several schools of thought within the constructivist paradigm (Cobb, 1994; Prawat & Floden, 1994). The two most prominent ones are radical constructivism and social constructivism. Their major difference is connected to the locus of knowledge construction. For the radical constructivists, knowledge is constructed in the head of the learner while they are re-organizing their experiences and cognitive structures (Piaget, 1970; Von Glasersfeld, 1989). But social constructivists believe that knowledge is constructed in communities of practice through social interaction (Brown, Collins, Duguid, 1989; Kuhn, 1996; Lave & Wenger, 1991; Vygotsky, 1978).

The most objectivist classroom environments

Much has been written about objectivism and the learning environments it creates (e.g. McDermott, 1993; Hanley, 1994; Williams and Burden, 1998; Winters, 2004). In objectivist classroom environments learning is thought to be a “mimetic” activity, a process including students repeating, or miming, newly presented information in reports or tests (Jackson, 1986). Objectivist instruction is regularly referred to as transmissive instruction, where knowledge is transmitted from teachers to learners. Objectivist educators believe that improving learning is a matter of more effectively communicating ideas to learners by improving the clarity of the message (Jonassen & Land, 2000). For objectivists, effective teaching means effective communication because teaching is viewed as a process of conveying ideas to students. The assumption underlying objectivist learning environments is that because teachers have studied ideas longer, they understand them better and are therefore better able to communicate or transmit them (Jonassen & Land, 2000). Students are viewed as passive learners who want to know the world as the teacher does. Students existing in objectivist environments have to submit themselves to deliberate instructional situations. Although most students in such environments have no desire, need, and interest to learn what teachers transmit to them, they are required to submit themselves to "acquiring" what teachers tell them, because it is assumed that teachers know better (Jonassen & Land, 2000). Objectivist teachers break wholes into parts and then focus separately on each part. But many students are not able to build concepts and skills from parts to wholes. "These students often stop trying to see the wholes before all the parts are presented to them and focus on the small, memorizable aspects of broad units without ever creating the big picture" (Brooks & Brooks, 1999, p.46).

In a nutshell, the main features of objectivist classroom environments can be summarized as follows:

- The direction of communication flow is mainly from teacher to learners
- Teachers heavily rely on textbooks and just try to transmit the information included in them to learners

- Cooperative activities are hindered because of the structures prevalent in the classroom
- Teachers tend to value correct answers and ignore students' thinking
- The assumption underlying the whole learning process is that there is a static objective world that students should try to know.

The most constructivist classroom environments

Constructivist learning environments provide learners with authentic or complex problems or projects that are supported by cases similar to the problem being posed, information resources, cognitive tools, and learning-support strategies such as modeling, coaching, and scaffolding (Jonassen, Marra & Palmer, 2003). Constructivist learning environments are student-centered and learner-controlled, emphasizing student responsibility and initiative in specifying learning goals and regulating their performance toward those goals, not just determining the path through a prescribed set of learning activities (Marra, 2004).

While objectivist environments, at best, increase learners' context-reduced and inert knowledge which is useful just on test occasions, social constructivist environments enhance learners' abilities of problem-solving, critical reflection, and thoughtful application of and contribution to knowledge based on a deep understanding of what is happening in the social context (Abednia, unpublished article).

Teachers in constructivist learning environments seek to ask big questions, to give the students enough time to think about them, and to direct students to the resources to find the answers. They know that the predefined sequence and timeline mostly interfere with their ability to help students understand complex concepts.

In general, the nature of questions presented to students greatly influences the depth to which the students search for answers. Posing problems of emerging relevance and searching for windows into students' thinking is one of the most important roles of the constructivist teacher and also a particular aspect of the teaching process occurring in constructivist environments.

Constructivist teachers believe that the part-to-whole approach is not necessarily predictive of student success. When designing curriculum, they organize information around conceptual clusters of problems, questions, and discrepant situations because students are most attracted when problems and ideas are given in a holistic manner rather than in separate, isolated parts.

Structuring curriculum around “big ideas” and broad concepts provides students a lot of opportunities: some become engaged through practical responses to problems, some analyze tasks based on models and principles, and others interpret ideas through metaphors and analogies from their unique perspectives. Using broad concepts, constructivist environments provide each student to participate irrespective of individual styles, temperaments, and dispositions.

In constructivist environments, students are at the center of instruction and their points of view are highly valued. As Brooks & Brooks (1999, p. 60) put it insightfully and interestingly:

> The more we study the learning process, the more we understand how fundamental students' points of view are. Students’ points of view are windows into their reasoning. Awareness of students’ points of view helps teachers challenge students, making school experiences both contextual and meaningful. Each student’s point of view is an instructional entry point that sits at the gateway of personalized education. Teachers who operate without awareness of their students’ points of view often doom students to dull, irrelevant experiences, and even failure.

Since students' points of view are valued in constructivist environments, these students are provided the opportunities to express their ideas. Constructivist teachers are also good listeners. It does not mean that constructivist teachers hinder the process of teaching in search and listening to their students' points of view. Teachers’ ability to uncover students’ conceptions is, to a large degree, a function of the questions and problems posed to students. Instead of seeking for "right" answers, the teacher can pose questions bringing about students' different points of view. Being “right” often limits the generation of new views.

Constructivist learning environments are also categorized as learner-centered ones in which students' interests and preferences affect all aspects of education. In constructivist learning environments, content, instructional materials, instructional media, and pace of learning are germane with the abilities and interests of each individual learner. These learning environments are elaborated with the premises that each learner is unique and "is an individual who must be helped to find his or her way to become autonomous" (Williams & L.Burden, 1998, p.194) and "learners have diverse learning styles, learn at different rates, have varying socioeconomic backgrounds, and have diverse intellectual strengths" (Dileo, 2007). Here the traits of the individual learner are given more consideration and learning is improved by varying the pace of instruction, the instructional method, and the content. In such settings, learner achievements are independent of each other, everyone has an equal opportunity of gaining a reward of some kind, and success or failure is more likely to be attributed to effort (Williams & L.Burden, 1998). Constructivist learning environments allow a student who is above or below "average" to move forward at their own pace for optimal learning. It is not necessary for students to repeat parts of a course that they have already mastered. Students learn the self-discipline and goal-orientation required to motivate them and to keep their progress on target. Furthermore, students can check their own results on classwork and ask for help when needed. Such environments "can be viewed as providing a form of self-competition, but differ from competitive structures in that they are essentially goal oriented and involve the development of self-awareness" (Williams & L.Burden, 1998, p.194).

In the learning and assessment processes, constructivist teachers come to view themselves as cognitively linked with the students they teach. Rather than using assessment results as indices indicating individual student knowledge, such information might shed light on the relationship between the student and the teacher. In constructivist classroom environments, "the student is not assessed in isolation, but in conjunction with the teacher, and both learn as a result of assessment" (Brooks & Brooks, 1999, p.87). As Newman, Griffin & Cole (1989, p.77) put it:

> Instead of giving the children a task and measuring how well they do or how badly they fail, one can give the children the task and observe

> how much and what kind of help they need in order to complete the task successfully. In this approach the child is not assessed alone. Rather, the social system of the teacher and child is dynamically assessed to determine how far along it has progressed.

Using such an approach, the teacher is able to simultaneously keep track of the cognitive functioning of the student, the disposition of the student, and the status of the teacher/student relationship. "Student conceptions, rather than indicating “rightness” or “wrongness,” become entry points for the teacher, places to begin the sorts of intervention that lead to the learner’s construction of new understandings and the acquisition of new skills" (Brooks & Brooks, 1999, p.88).

The two ends of one continuum

Viewing objectivism and constructivism as the two opposing points of one continuum is not a new idea. Several studies (e.g., Vrasidas, 2000 and Jonassen, 1991) pinpoint this idea and reject the mutually exclusiveness of the two paradigms. But it is the significance of the idea for learning environment studies that deserves more attention. The ramification of this idea is that the learning environments brought about by objectivist and constructivist assumptions and practices should also be plotted at opposite ends of a continuum. In the following part the idea is considered in more detail.

Those who believe mutually exclusiveness of the two paradigms are probably the ones who just theoretically compare the two and don't take into consideration the practicality of their idea. Categorizing a teacher or their approach as either constructivist or objectivist is too remote from the ideas such as "reflective eclecticism" (Posner, 1995, p.4) or the belief that "different situations require different practices” (ibid).

Exploring learning environments also leads to the idea that the two approaches should be viewed as a set of tools from which teachers and educators can select the most appropriate for a given purpose. A learning environment can be the one affected at the same time by both objectivist and constructivist ideas. There are two reasons for such a synthesis. First, the nature of the class and the nature of the subject require the eclectic and experienced teacher to switch between objectivist and constructivist ideas, hence to

create a blended environment. In some instances the constructivist teacher prefers a more linear approach (which is one of the features of objectivist teaching). For example, in teaching someone how to use a computer, a non-linear approach can be effective just for a short period of time. After that time, the learner will be frustrated unless the teacher sets the steps for them to follow. Second, the pragmatic constraints of learning and teaching pose clear restrictions on the use of pure constructivism (Nunes & McPherson, 2003). For example, evaluating and assessing students learning without concrete criteria and objective can be so demanding for the constructivist teacher. Sometimes he/she has to use traditional and objectivist ways of assessing because being a totally constructivist teacher (hence creating a pure constructivist learning environment) is difficult to reach in practice. In fact, synthesizing constructivist and objectivist approaches may provide teachers, designers and educationalists with more applicable approaches which in turn lead to the creation of objectivist-constructivist blended learning environments.

Implications for the field of learning environment research

The idea that constructivist and objectivist learning environments are two opposing points of a continuum can be of significance to the field of learning environment research. New horizons will emerge for the field and new research opportunities appear when a subtle look at CLES reveals that it has capabilities other than those mentioned by its authors or other researchers. Before discussing these unnoticed capabilities, a brief history of CLES seems helpful.

The CLES was developed to assist researchers and teachers to assess the degree to which a particular classroom environment is consistent with a constructivist epistemology, and to assist teachers to reflect upon their epistemological assumptions and reshape their teaching practice (Fraser, 2002).

The first version of the CLES (Taylor, Fraser & Fisher, 1993, cited in Johnson & McClure, 2003) consisted of 28 items included in four scales (i.e., Autonomy, Prior Knowledge, Negotiation, and Student Centeredness). Later it was revised and another scale was added as a response to the lack of any critical theory perspective in this instrument. The result was a 30-item questionnaire with five scales: Personal Relevance,

Uncertainty, Critical Voice, Shared Control, and Student Negotiation (Taylor, Fraser & Fisher, 1997). Each item can be responded on a five-point Likert scale ranging from Almost Never to Almost Always. There are versions for both science and for mathematics as well as for teachers and for students in actual and preferred forms.

The CLES is one of the most applicable instruments in the field and it has been used in a variety of studies which evaluate psychosocial aspects of science and mathematic classrooms in different educational settings in different countries (e.g. Nix, Fraser & Ledbetter, 2005; Johnson & McClure, 2003; Dorman, 2001; Harwell, Gunter, Montgomery, Shelton & West, 2001; Waggett, 2001; Aldridge, Fraser, Taylor & Chen, 2000). It has assisted the researchers to determine whether students are satisfied -from a constructivist perspective- with their classroom environments and the dimensions from which probable students' dissatisfaction stems from. It has also been used to explore the association between student outcomes and environment in an educational setting or in cross-national studies, or to investigate differences between students' and teachers' perceptions of the same classroom. Beside these applications, CLES has other capabilities which have gone unnoticed by learning environment researchers:

- The actual form of CLES is able to spot the exact place of a learning environment along an objectivist-constructivist continuum.
- The preferred form of CLES can help the researchers to explore how prepared respondents (including students and teachers) are to accept a classroom environment totally constructivist in culture.

In the following part these capabilities will be discussed in detail. With regard to the first claim, since the Likert scale on the actual form of CLES can be scored from 1 to 5, a 1-to-5 continuum can be defined. 1 stands for most objectivist classroom environments and 5 stands for most constructivist ones (Fig. 1). By dividing the average score of all respondents (e.g., 84) by the number of items on the actual form (30, if you are using the CLES elaborated by Taylor et. al, (1997)), a point (e.g., 2.8) is calculated as the exact place of the participants' classroom environment along a one-to-five continuum that begins with the most objectivist classroom environments and ends with the most social constructivist ones. By taking into account the five scales of CLES-ELT, one can determine the place of each classroom environment dimension (i.e., Personal relevance,

Uncertainty, Critical voice, Shared control and Student negotiation) along the mentioned continuum. The measures that should be taken to adopt social constructivist environments can be presented based on these results. In addition, such results can help us to document and to investigate the progresses we have made or the changes we have aimed to exert in classroom environments.

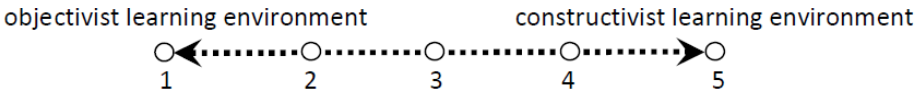

Figure 1. The one-to-five objectivist learning environment-constructivist learning environment continuum

Regarding the second claim, Windschitl (1997) defines four categories of dilemmas that educators face when implementing constructivism. These challenges are as following: (1) "dealing with the complexity of constructivism as a philosophy" (i.e., conceptual dilemma), (2) "preparing for the subject matter understanding and special pedagogical expertise that constructivist instruction demands" (i.e., pedagogical dilemma), (3) "re-envisioning the culture of the classroom" (i.e., cultural dilemma) and (4) "facing political challenges that arise when implementing constructivist instruction in school settings" (i.e., political dilemma) (Windschitl, 1997, p.1). The relation of the idea to our discussion is that the preferred form of CLES can help educators to meet the cultural challenge. The cultural challenge can be viewed as a two-dimensional issue. One dimension is related to teachers who must consider constructivism as a culture, as "a set of beliefs, norms and practices that constitute the fabric of school life" (Windschitl, 1997, p.12) not as a set of isolated instructional methods. Considering the constructivist classroom as a culture is of utmost significance because so many challenges emerge for the teacher when new instructional methods take root and affect the previous ways of teaching and learning. The other dimension is related to the students who must be prepared to change their previous beliefs systems and to accept alternative patterns of beliefs and practices. Meeting the cultural challenge can be very difficult since the dominant culture in most schools is that of coping and submission, where following curriculum is the number one concern of many teachers and looking upon students as passive learners is the common idea (these are the features of objectivist classroom

environments mentioned above). The preferred form of CLES, aiming to explore what respondents prefer as their ideal classroom environment from a constructivist perspective, can help the researchers to spot how much the respondents are prepared to accept a classroom environment dominated by a constructivist culture. Again a one-to-five continuum can be defined for the preferred form and the exact place of the respondents' ideal classroom can be plotted on this continuum. The lower the point, the more effort and work are needed to overcome the cultural challenge in implementing constructivism. While upper points show that respondents are ready to accept a constructivist culture and the road to a classroom environment totally constructivist in culture or in nature will be shortened. What is obvious is that there is no exact relationship between the calculated point and the amount of work needed to meet the cultural challenge. But informed instructional decisions do not take place in a vacuum and the proposed procedure can be a good starting point in meeting the cultural challenge which educators face when implementing constructivism.

This potentiality of the preferred form of CLES can be viewed from another perspective. The assumption here is that the teachers' and students' beliefs about constructivist ideas and practices can be looked upon like windows through which one can examine application of constructivism for a learning context. The idea that students and teachers in an educational context prefer constructivist ideas and practices (which lead to constructivist learning environments) can be used as further evidence attesting applicability of constructivism to that educational context. Again, the capability of the preferred form of CLES emerges here. If a one-to-five continuum is defined for this form, one can determine the exact place of the environment the respondents prefer or through which find their learning or teaching as a meaningful and motivating process. Points above three on the one-to-five continuum that begins with the most objectivist classroom environments and ends with the most constructivist ones indicate that respondents prefer classroom environments that are mostly or totally constructivist. In this way one can inspect applicability of constructivism for an educational context which is not used to constructivism and aims to shift to these ideas in a large scale. This issue is of more significance for those countries, especially Asian countries, to which constructivism seems foreign. It should be indicated that obtaining upper points cannot solely lead us to

conclude that constructivism is applicable to an educational context. More exploration will be needed for such a conclusion but at least teachers or students prefer such ideas as an alternative helping them to find their learning as a meaningful and motivating process.

Summary

Comparing objectivism and constructivism according to the learning environments they create gives us a more holistic picture of merits or demerits of these approaches. Such an approach was adopted in this study to show how important the epistemology a teacher or an educator adopts or believes to is and how a simple assumption affects a range of factors which form 'determinants' of learning. Above all, reemphasizing the idea that objectivism and constructivism are the two opposing points of a continuum, rather than two mutually exclusive approaches, this study paved the way to reveal the significance of the idea for the field of learning environment research. It was mentioned that objectivist and constructivist learning environments should also be viewed as the two ends of one continuum. A learning environment can be the one affected at the same time by both objectivist and constructivist ideas. There are two reasons for such a synthesis. First, the nature of the class requires the eclectic and experienced teacher to switch between objectivist and constructivist ideas, hence to create a blended environment. Second, the pragmatic constraints of learning and teaching pose clear restrictions on the use of pure constructivism (Nunes & McPherson, 2003). In fact, synthesizing constructivist and objectivist approaches may provide teachers, designers and educationalists with more applicable approaches which in turn lead to the creation of objectivist-constructivist blended learning environments. Finally, the contribution of the idea that objectivist and constructivist learning environments can be plotted at opposite ends of a continuum was put forward. The actual form of CLES, one of the most applicable instruments in the field, is also able to spot the exact place of a learning environment along an objectivist-constructivist continuum while its preferred form can help the researchers to explore how prepared are respondents (including students and teachers) to accept a classroom environment totally constructivist in culture. In addition, the preferred form can also help us to gain more

evidence concerning the applicability or inapplicability of constructivist views for an educational context.

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